

### Assembly - QXIII Color Organ

Be very careful when assembling your color organ and use only the solder supplied or an equivalent 60/40 alloy resin core solder. Do not use acid core solder or any type paste flux. We will not guarantee or repair a kit on which either product has been used.

#### Construction

- ( ) Do not solder any connections until told to do so.
- ( ) Clean the bottom of the circuit board with a fine piece of Scotchbrite® if it appears oxidized.
- ( ) Mount the jumper wires on the printed circuit board. The placement of these jumpers is indicated by the solid lines printed on the top of the board. The wires may be cut from #22 or #24 gauge bus wire or you may strip the insulation off some of the wire supplied with your kit and use this instead. Bend the leads of these jumpers, on the foil side of the board and trim so that 1/16" to 1/8" of wire remains. Solder these connections.
- ( ) Mount the resistors excluding R12 thru R15. As with other component mounting unless otherwise noted; use the parts list and printing on the top of the board to locate the proper position for each part. Mount the component flush with the top of the board, bend the leads parallel to the board on the foil side and trim so that 1/16" to 1/8" of wire remains. Solder these connections.
- ( ) Mount the capacitors. Be sure to orientate electrolytic capacitors so their polarity agrees with that indicated on the board. Solder these connections.
- ( ) Mount the diodes on the printed circuit board. Be sure to insert the diodes so that the banded end of the diode corresponds to the band indicated on the circuit board. Solder these connections.
- ( ) Mount all transistors except Q17-Q20. All transistors should have about 1/4" between the bottom of the transistor case and the top of the board. Be sure to orientate Q1 and Q2 properly. Solder these connections.
- ( ) Cut off the center lead on each of the four triacs (Q17-Q20).
- ( ) Mount Q17 - Q20. A heat sink is placed between each triac and the top of the board and is held in place by a #4-40 x 3/8" screw, lockwasher, and nut. Solder these connections. Be sure the lockwashers, and nut do not touch any foil other than that surrounding the hole region.

- ( ) Mount the integrated circuits making sure to orientate each of the integrated circuits properly. Solder these connections.
- ( ) T1 is the larger of the two transformers supplied with your kit. Cut each of its five leads so that each lead is approximately 3" long.
- ( ) Mount the transformer T1 on the top side of the circuit board. Orientate the transformer so the black leads are adjacent to the edge of the board and the green leads are adjacent points U and V. Secure the transformer to the board using #6 - 32 x 1/4" screws and nuts.
- ( ) Solder transformer T1's leads so that the black leads connect to the pads near the edge of the board, the red leads to point U and V and the yellow lead to point G.
- ( ) T2 is the smaller of the two transformers supplied with your kit. Cut each of its leads so they are approximately 2 1/2" long. The primary side of the transformer will usually consist of a pair of black leads. The secondary side may consist of either lugs or wires. The center lug or banded wire is a center tap and is not used. If there is any doubt as to which pair of leads is the primary and secondary measure the DC resistance. The primary of the transformer will have a higher DC resistance than the secondary.
- ( ) Mount the transformer T2 on the top side of the circuit board. Orientate the transformer so that the secondary side is adjacent triac Q17. Secure the transformer to the board using #6 - 32 x 1/4" screws and nuts.
- ( ) Solder transformer T2's leads so the primary and secondary leads connect to the pads provided at the edge of the transformer shell.
- ( ) Check over the bottom of the board and make sure that all connections have been soldered.

### Final Wiring

The unit should be wired as shown in the wiring diagram. Each of the four channels is capable of handling up to 800 watts of 117 volt lights. Although high wattage spots or floods may be used, it is recommended that parallel combinations of smaller lights (40 watts or less) be used instead since the smaller lights have a faster response time. Fuse F1 and switch S1 must be capable of handling the total amount of current drawn by the unit and the lights. Since the lights draw much more than their rated power for a short period of time after turn on, it is best to use a slo-blo fuse. It's rated current should be about 1 amp for every 100 watts of bulbs connected to the unit. If the total combination is greater than 1000 watts, use a heavier line cord than

that supplied with your kit. All of the wiring interconnecting the lights and points W, X, A, B, C and D must carry an amount of current dependent upon the wattage of the lights, so use at least #18 gauge wire and go to a heavier gauge if more than 500 watts of bulbs are connected to the unit. Potentiometers R12 thru R15 are the channel sensitivity controls for the unit. Both they and switch S1 should be mounted on a control panel of some kind.

The unit may be connected to either a monural or stereo sound system assuming the stereo system has a common ground between the left and right channels. The correct wiring procedure is shown in the wiring diagram.

Warning -- After the unit has been wired as shown in the wiring diagram all points on the circuit board, excluding the secondary side of transformer T2, are either directly or indirectly connected to one side of the line cord. This means that after the unit is plugged in, most of the points on the circuit board are electrically "hot". So be sure not to attempt repairs or measurements on the unit while it is plugged in.

Upon the completion of all wiring, the background controls R52 thru R55 should be set. With no audio input signal connected to the unit, temporarily short the audio input terminals and apply power to the color organ. Carefully set each of the background controls so that each channel of lights just goes out. These controls set the "no signal" intensity level of the lights and should be adjusted so the lights are turned on just slightly, but not enough to be visible when viewing the display lights.

Be sure not to touch any of the metallic portions of the components, including the heat sinks when adjusting the background controls. Remember the circuit ground is electrically "hot" as long as the unit is plugged in to the AC outlet.

After setting the background controls, remove the audio input short and connect an audio source.

### How It Works

The QX-III color organ is an active filter device driving phase controlled triac lamp drivers to obtain lamp operation. It uses an automatic level control to provide uniform lamp operation at various audio levels.

Transformer T1 and its associated components provide the +18 and -18 volts required by the IC's and related circuitry in the unit. Transformer T2 is the audio transformer which serves to isolate the audio source from the "hot" ground of the unit. IC1 and its associated components form an automatic level control circuit which insures a uniform input level to each of the active filter input circuits. IC2 thru IC5 and their associated components form the active filters which filter the audio information by frequencies. Each filter is composed of

a high pass and low pass filter which when put in series, form a bandpass filter. The input of each filter is then rectified and fed into the input of an integrator. Each integrator is recycled 120 time/second by the transistors across the integrating capacitor of each integrator. The output of each integrator is fed to a transistor comparator and onto a triac driver and triac. The display lamps vary in intensity in accordance with the frequency content of audio with channel "A" being the lowest frequencies and channel "D" being the highest.

# Parts List -- QX-III Color Organ

## Resistors

<input checked="" type="checkbox"/> R1	10K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R42	10K ohm 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R2	47 ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R43	" " " " " "
<input checked="" type="checkbox"/> R3	470K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R44	" " " " " "
<input checked="" type="checkbox"/> R5	100K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R45	" " " " " "
<input checked="" type="checkbox"/> R6	" " " " " "	<input checked="" type="checkbox"/> R46	" " " " " "
<input checked="" type="checkbox"/> R7	10K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R47	" " " " " "
<input checked="" type="checkbox"/> R8	1K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R48	100K ohm 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R9	10K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R49	" " " " " "
<input checked="" type="checkbox"/> R10	4.7K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R50	" " " " " "
<input checked="" type="checkbox"/> R11	680 ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R51	" " " " " "
<input checked="" type="checkbox"/> *R12	10K ohm linear taper potentiometer	<input checked="" type="checkbox"/> *R52	250K ohm trimmer resistor (x201R254B)
<input checked="" type="checkbox"/> *R13	10K ohm linear taper potentiometer	<input checked="" type="checkbox"/> *R53	250K ohm trimmer resistor (x201R254B)
<input checked="" type="checkbox"/> *R14	10K ohm linear taper potentiometer	<input checked="" type="checkbox"/> *R54	250K ohm trimmer resistor (x201R254B)
<input checked="" type="checkbox"/> *R15	10K ohm linear taper potentiometer	<input checked="" type="checkbox"/> *R55	250K ohm trimmer resistor (x201R254B)
<input checked="" type="checkbox"/> R16	15K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R56	1K 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R17	22K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R57	" " " " " "
<input checked="" type="checkbox"/> R18	4.7K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R58	" " " " " "
<input checked="" type="checkbox"/> R19	15K 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R59	" " " " " "
<input checked="" type="checkbox"/> R20	" " " " " "	<input checked="" type="checkbox"/> R60	4.7K ohm 1/2 watt resistor
<input checked="" type="checkbox"/> R21	22K 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R61	" " " " " "
<input checked="" type="checkbox"/> R22	4.7K 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R62	" " " " " "
<input checked="" type="checkbox"/> R23	15K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R63	" " " " " "
<input checked="" type="checkbox"/> R24	1.5K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R64	10K ohm 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R25	2.2K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R65	" " " " " "
<input checked="" type="checkbox"/> R26	470 ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R66	" " " " " "
<input checked="" type="checkbox"/> R27	1.5K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R67	" " " " " "
<input checked="" type="checkbox"/> R28	39K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R68	2.2K ohm 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R29	10K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R69	2.2K ohm 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R30	2.2K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R70	" " " " " "
<input checked="" type="checkbox"/> R31	2.7K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R71	" " " " " "
<input checked="" type="checkbox"/> R32	39K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R72	330 ohm 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R33	10K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R73	" " " " " "
<input checked="" type="checkbox"/> R34	2.2K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R74	" " " " " "
<input checked="" type="checkbox"/> R35	2.7K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R75	" " " " " "
<input checked="" type="checkbox"/> R36	82K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R76	1K ohm 1/2 watt 10% resistor
<input checked="" type="checkbox"/> R37	22K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R77	" " " " " "
<input checked="" type="checkbox"/> R38	4.7K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R78	" " " " " "
<input checked="" type="checkbox"/> R39	" " " " " "	<input checked="" type="checkbox"/> R79	" " " " " "
<input checked="" type="checkbox"/> R40	10K ohm 1/2 watt 10% resistor	<input checked="" type="checkbox"/> R80	47 ohm 2 watt 10% resistor
<input checked="" type="checkbox"/> R41	" " " " " "	<input checked="" type="checkbox"/> R81	22K 1/2 watt 10% resistor
		<input checked="" type="checkbox"/> R82	" " " " " "



### Capacitors

✓ *C1 10 mfd electrolytic capacitor radial lead	✓ C16 .01 mfd film capacitor radial lead
✓ *C2 100 mfd electrolytic capacitor radial lead	✓ C17 .01 mfd film capacitor radial lead
✓ *C3 1 mfd electrolytic capacitor radial lead	✓ C18 1000 pfd poly capacitors axial lead
✓ *C4 1 mfd electrolytic capacitor radial lead	✓ C19 .1 mfd film capacitor radial lead
225V ✓ *C5 470 mfd or 500 mfd electrolytic capacitor radial lead	✓ C20 .1 mfd film capacitor radial lead
✓ *C6 470 mfd or 500 mfd electrolytic capacitor radial lead	✓ C21 .1 mfd film capacitor radial lead
✓ C7 .47 mfd film capacitor radial lead	✓ C22 .01 mfd film capacitor radial lead
✓ C8 .1 mfd film capacitor radial lead	✓ *C23 1 mfd electrolytic capacitor radial lead
✓ C9 .1 mfd film capacitor radial lead	✓ *C24 1 mfd electrolytic capacitor radial lead
✓ C10 .01 mfd film capacitor radial lead	✓ *C25 1 mfd electrolytic capacitor radial lead
✓ C11 .47 mfd film capacitor radial lead	✓ *C26 1 mfd electrolytic capacitor radial lead
✓ C12 .1 mfd film capacitor radial lead	✓ C27 .1 mfd film capacitor radial lead
✓ C13 .1 mfd film capacitor radial lead	✓ C28 .1 mfd film capacitor radial lead
✓ C14 .01 mfd film capacitor radial lead	✓ C29 .1 mfd film capacitor radial lead
✓ C15 .01 mfd film capacitor radial lead	✓ C30 .1 mfd film capacitor radial lead
	✓ C31 .01 mfd film capacitor radial lead
	✓ C32 .47 mfd film capacitor axial lead 250 V

*off board across line*

### Semiconductors

✓ *D1 1N4003 diode	✓ *D6 1N4148 diode
✓ *D2 " "	✓ *D7 " "
✓ *D3 " "	✓ *D8 " "
✓ *D4 " "	✓ *D9 " "
✓ *D5 1N5230 zener diode	✓ *D10 1N4148 diode
✓ *IC1 4558 integrated circuit	✓ *IC5 4558 integrated circuit
✓ *IC2 " " "	✓ *IC6 " " "
✓ *IC3 " " "	✓ *IC7 " " "
✓ *IC4 " " "	

✓ \*Q1 TIS58 FET  
 ✓ \*Q2 2N5210 transistor  
 ✓ \*Q3 2N5129 "  
 ✓ \*Q4 " "  
 ✓ \*Q5 " "  
 ✓ \*Q6 " "  
 ✓ \*Q7 " "  
 ✓ \*Q8 " "  
 ✓ \*Q9 " "  
 ✓ \*Q10 " "

✓ \*Q11 2N5129 transistor  
 ✓ \*Q12 " "  
 ✓ \*Q13 2N5139 transistor  
 ✓ \*Q14 " "  
 ✓ \*Q15 " "  
 ✓ \*Q16 " "  
 ✓ \*Q17 T2800 or 40668 triac  
 ✓ \*Q18 " " "  
 ✓ \*Q19 " " "  
 ✓ \*Q20 " " "

#### Miscellaneous

✓ \*T1 24V CT power transformer  
 ✓ \*S1 slide switch

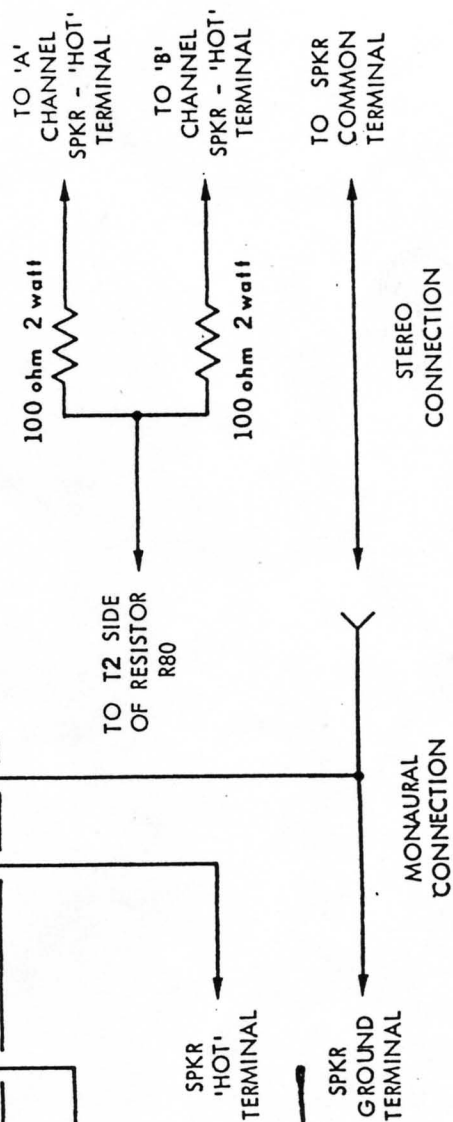
✓ \*T2 Z3401A audio transformer  
 ✓ F1 fuse. (see text)

All components flagged with a \* must be oriented as shown in the component layout drawing.

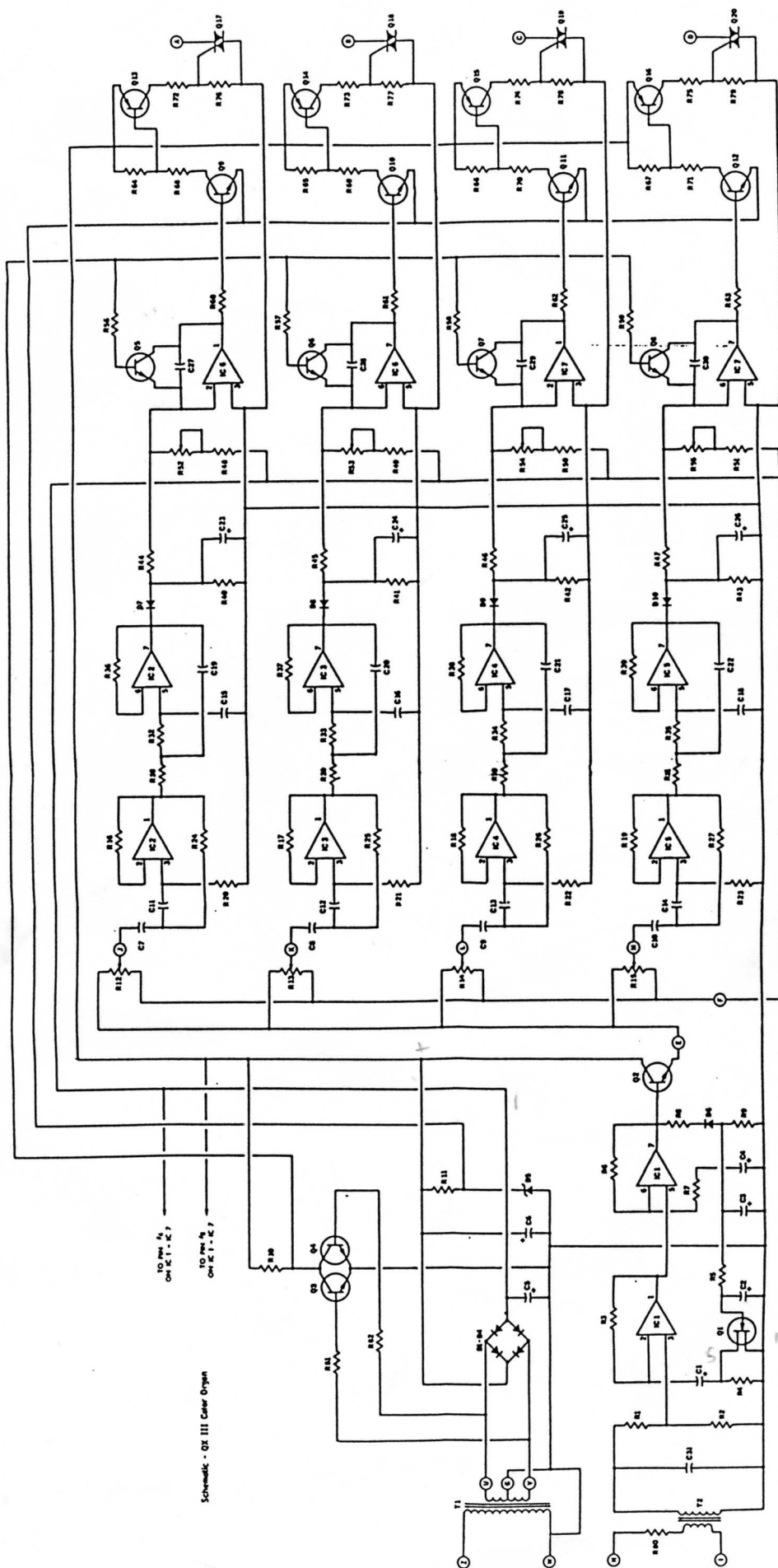
T1 HAMMOND 166 G 25 — 15AMP  
 T2 HAMMOND 146K — Primary 1K $\Omega$   
 Secondary 8 $\Omega$   
 700MW rating

The diagram illustrates a car stereo circuit with the following components and connections:

- Power Section:** A switch **S1** is connected to a fuse **F1**, which is in series with a capacitor **C32**. The circuit then splits into two main paths.
- Speaker Section:** The main signal path goes through a multi-tap switch with positions **LOW**, **MED LOW**, **MED HIGH**, and **HIGH**. Each position is connected to a different tap on a resistor network. This network is connected to four speakers (**R12**, **R13**, **R14**, **R15**) through a series of resistors and capacitors. The speakers are labeled with terminals **M**, **L**, **K**, **J**, **E**, and **F**.
- Control Section:** A **SENSITIVITY** control is connected to the main signal path. The circuit also includes a **T2 SIDE OF RESISTOR R80** and various speaker terminals including **SPKR - HOT**, **SPKR - COMMON**, and **SPKR - GROUND**.
- Connections:** The diagram shows connections for a **MONAURAL CONNECTION** and a **STEREO CONNECTION**.







Schematic - QX III Color Organ

